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Computer Engineering Series

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NOTE

This standard has been converted from the original paper format to electronic format without substantive change in series coverage or grading criteria. The standard was reviewed to correct errors that may have been introduced during the conversion process. In some standards minor corrections were made such as updating references to other documents that may have become obsolete, or correcting minor typographical errors in the original standard. Any errors that remain due to conversion to electronic format should be minor and are not intended to change the meaning of the original standard.

If you find page references near the right hand margin of this standard they indicate the pagination of the official, printed version of this standard. For example, a notation "PAGE 2, 4/88, TS-87" would mean that (1) page two of the printed version begins here, (2) the date of issuance was 4/88, and (3) the Transmittal Sheet number was TS-87.

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SERIES DEFINITION

This series includes professional engineering positions which require primarily the application of knowledge of (a) fundamentals and principles of professional engineering, (b) computer hardware, systems software, and computer system architecture and integration, and (c) mathematics, including calculus, probability, statistics, discrete structures, and modern algebra. The work pertains primarily to the research, design, development, testing, evaluation, and maintenance of computer hardware and software systems in an integrated manner.

OCCUPATIONAL INFORMATION

Positions in the Computer Engineering Series involve the application of scientific discipline and professional engineering principles to complex computer based systems that require research, design, development, and maintenance of computer equipment and interfaces(hardware) and applications and support (software). These positions are found in agencies that have requirements for the development and use of unique systems such as embedded computers in weapons or weapons-support systems, systems for complex scientific applications, simulation systems, communication systems, computer-aided engineering and design systems, and large-scale management information systems.

Terms and definitions common to this occupation can be found in the American National Dictionary for Information Processing Systems, published by the Computer and Business Equipment Manufacturer's Association, Washington, D.C., and in the Glossary of Terms contained in the Position-Classification Standard for the Computer Specialist series, GS-334.

Typical functions performed by Computer Engineers include:

-- Research into technological areas related to the engineering of computer hardware and software (e.g., advanced component technologies, software tools and methods, and digital theory);

-- Analysis of system requirements to establish functional requirements and identify and perform hardware/software trade-offs;

-- Conceptual design of computer systems through analysis of computer hardware, interface hardware, software requirements, and network architectures as elements of total system design;

Formulation and conduct of demonstrations to validate design concepts and to provide a basis for full-scale engineering development and subsequent production;

-- Application of state-of-the-art computer engineering methodologies used to implement computer systems designs;
-- Design of computer hardware and software systems including modifications to existing systems;

-- Preparation of hardware and software specifications for contract work, evaluation of contract work, and establishment of test requirements and validation procedures to measure performance quality and reliability.

EXCLUSIONS

Some positions having duties that meet the Computer Engineering series definition may be interdisciplinary with and classifiable to other professional series; such interdisciplinary, or multi disciplinary, positions may be filled by persons with training and experience in one of the fields involved and classified to the appropriate professional series for that field. Interdisciplinary procedures for professional positions are discussed in the Introduction to Position-Classification Standards and may be used at the discretion of the agency.

Positions having duties that appear to meet the Computer Engineering series definition and that also overlap with duties described in anon-professional series such as the Computer Specialist Series, GS-334, require a determination as to whether the duties require a professional engineer; positions are not to be classified in the Computer engineering Series unless there is a stated basis for requiring application of professional engineering qualifications. The basis for the required application of professional qualifications should be reflected in the classification factors.

Computer Engineering is a new occupation combining elements from several related disciplines: Electronics Engineering, Computer science, and Mathematics. This series is established to recognize the emergence of Computer Engineering as an academic discipline and to meet the needs of the Federal service for recruitment of graduates of accredited Computer Engineering or Software Engineering curricula. Before the emergence of Computer Engineering as a separate engineering discipline, most work of this type was performed by Electronics engineers. The distinction between the two series is that Computer engineers provide a balanced hardware/ of ware engineering expertise, whereas Electronics Engineers are primarily concerned with systems hardware and are less concerned with the design, development, test, or evaluation of computer software and the integration of computer hardware and software. Work involving large computer-based electronic systems such as radar, navigation, or communications systems may be performed by either Electronics Engineers or Computer Engineers depending upon the primary emphasis of the work. Because of the overlap in duties of these closely related series, determination of series will

depend on organizational needs in terms of professional qualifications required; the basis for this decision should be reflected in the classification factors. Also, the interdisciplinary procedure discussed above may be appropriate for positions that could be classified to either of these series.

The following types of positions illustrate those which are excluded from the Computer Engineering Series because of the nature of the paramount qualification requirements and the primary emphasis of the work:

1. Positions involving work requiring primarily knowledge of the principles, techniques, and practices of electronics engineering, pertaining to electronic circuits, circuit elements, equipment, systems, and associated phenomena, are classified in the Electronics Engineering Series, GS-855

2. Positions involving work in computer engineering as an incidental or secondary part of broader assignments which primarily require specialized knowledge of the principles and practices of another field of engineering are classified in other appropriate series in the Architecture and Engineering Group, GS-800. (Engineers in any engineering discipline may use the computer as a tool in the analysis and solution of engineering problems and may develop their own software in the process of using the computer as a tool in performing assignments.)

3. Positions involving computer engineering work in combination with work in several other fields of engineering where no one field is predominant are classified in the General Engineering Series, GS-801.

4. Positions involving work requiring primarily professional knowledge of computer theory, algorithms, data structures, programming concepts, programming languages, and computer elements and architecture to design, develop, test or evaluate computer software or perform research to advance the knowledge of computer science, and a working knowledge of computer hardware, are classified in the Computer Science Series, GS-1550.

5. Positions involving research on basic mathematical principles, methods, procedures, techniques, or relationships, including the development of mathematical models and methods, that make use of computers as a tool in the performance of duties, are classified in the Mathematics Series, GS-1520.

6. Positions involving work requiring primarily knowledge of operations or processes being automated and of current and evolving computer technology to develop data processing applications are classified in the Computer Specialist Series, GS-334.

AUTHORIZED TITLES

-- Computer Engineer is the authorized title for nonsupervisory positions classified in this series.

-- Supervisory Computer Engineer is the authorized title for positions which involve supervisory duties and responsibilities as defined by the Supervisory Grade-Evaluation Guide.

GRADE LEVEL CRITERIA

This series-coverage standard does not provide grade level criteria. Positions in this series that are engaged in the functions listed below are to be evaluated or classified to grade level as follows:

Research -- Positions engaged in basic and applied research should be evaluated by reference to the Research Grade-Evaluation Guide.

Development -- Positions concerned with in-house or contractual development should be evaluated by reference to the Equipment development Grade-Evaluation Guide.

Supervision -- Supervisory positions should be evaluated by reference to the Supervisory Grade-Evaluation Guide.

All other positions may be evaluated by the General Grade-Evaluation guide for Nonsupervisory Professional Engineering Positions, GS-800, and cross comparison to other appropriate professional standards.